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Upper Limb Capabilities, Self-Care and Fine Motor Activities with and Without Equipment in Persons with Cervical Spinal Cord Injury at Discharge from Rehabilitation and 1 Year Post-Injury

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Introduction: There is little information on the impact of assistive technology or devices (AT) on function. The purpose of this project was to explore the impact of AT on self-care (SC) and fine motor (FM) function in persons with cervical SCI, and to examine the functional capabilities of those who benefit from AT.

Methods: Persons with acute cervical SCI, all levels and AIS grades, with an upper extremity motor score (UEMS) > 0 were enrolled. At discharge from rehabilitation and 1 year post-injury we collected the Capabilities of Upper Extremity questionnaire (CUE-Q), and the combined SC and FM questions of the SCI Functional Index (SCI-FI) and SCI-FI/AT short forms. The arm with the highest CUE-Q side score was designated the better side. The impact of AT on SC and FM function was evaluated by looking at the difference in SCI-FI and SCI-FI/AT scores, and changes over time.

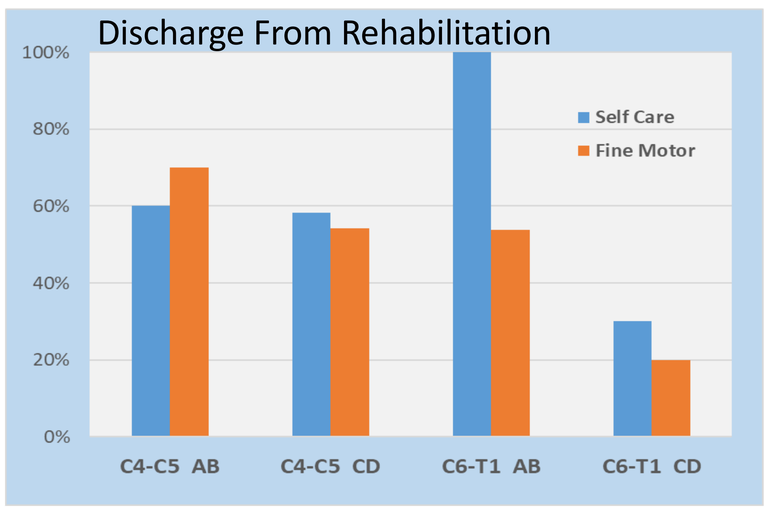
Results: There were 67 participants with data at rehab discharge and 1-year post-injury, 50 male and 17 female, average age 43.3 ± 15.6 years.

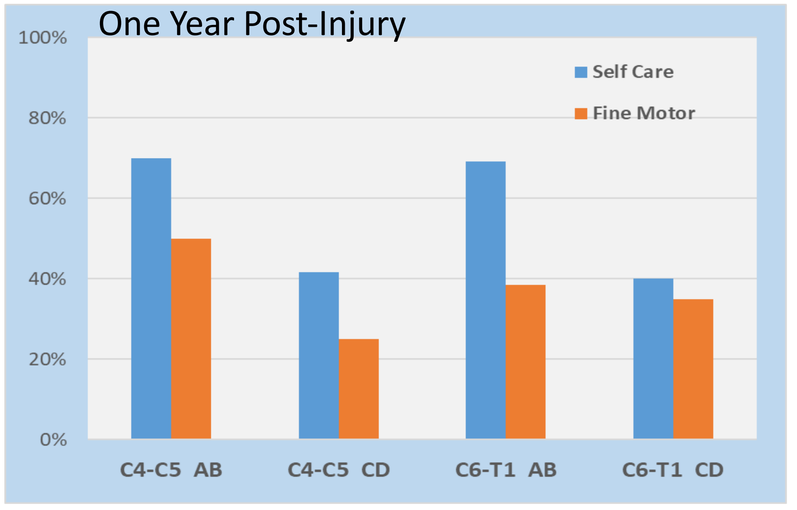
- Median scores by neurologic groupings are shown in the table. All groups demonstrated improvements in CUE-Q and SCI-FI scores from discharge to 1 year post-injury **(table and radar charts)**.
- By neurologic group, AT was useful for the greatest percentage of persons classified as C4-C5 AB for FM and C6-T1 AB for SC), least useful for C6-T1 CD **(charts at right)**.
- AT was helpful for the greatest number of items for SC in the C4-C5 CD group at discharge (**bolded numbers in table**).
- There tended to be less use of AT for tasks at 1 year compared to rehab discharge. For example, the percentage of persons using AT for brushing teeth at discharge was 48%, while at 1 year it was only 25%.

Table — Median Score at Discharge and 1-year post-injury

BML AIS	N (%)	Best side CUE (0-60)		Self-care (0-48)		Self-care AT (0-48)		Fine Motor (0-48)		Fine Motor AT (0-48)	
		DC	1-YR	DC	1-YR	DC	1-YR	DC	1-YR	DC	1-YR
C4-C5 AB	10 (15)	14.5	20.0	1.5	3.0	2.5	5.5	2.0	8.0	5.0	9.0
C4-C5 CD	24 (36)	33.5	48.5	**9.0**	23.5	**13.0**	25.0	11.5	27.0	15.5	28.5
C6-T1 AB	13 (19)	38.0	50.0	18.0	29.0	20.0	32.0	16.0	28.0	17.0	28.0
C6-T1 CD	20 30)	53.0	58.0	32.5	41.0	34.5	43.0	32.5	40.5	35.0	40.5

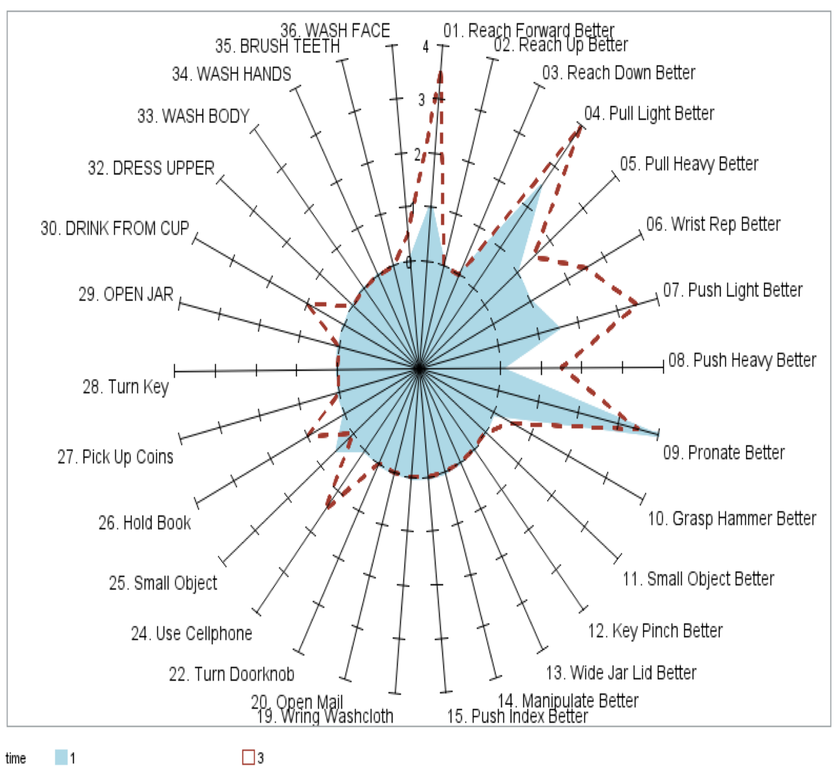
Percent of participants who were helped on at least one SCI-FI item using AT by neurologic group



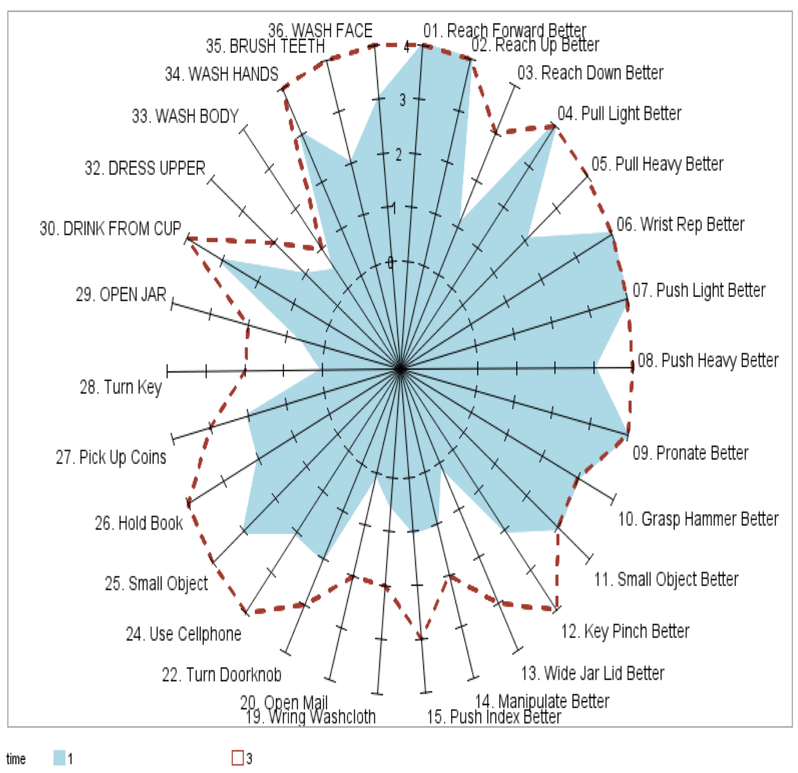


Radar Charts: Scores of CUE-Q and SCI-FI items from zero (innermost circle) to 4 (outer circle).
(scores 0= unable to do; 1=much/severe difficulty; 2=some/moderate difficulty; 3=a little/mild difficulty; 4=no difficulty)
Below: Better side CUE-Q items on right and SCI-FI items on left . Blue shading represents scores at rehab discharge. Red dashed line scores at 1-year post-injury.
Distance along radius from blue shading to red line represents improvement from discharge to one-year post-injury.

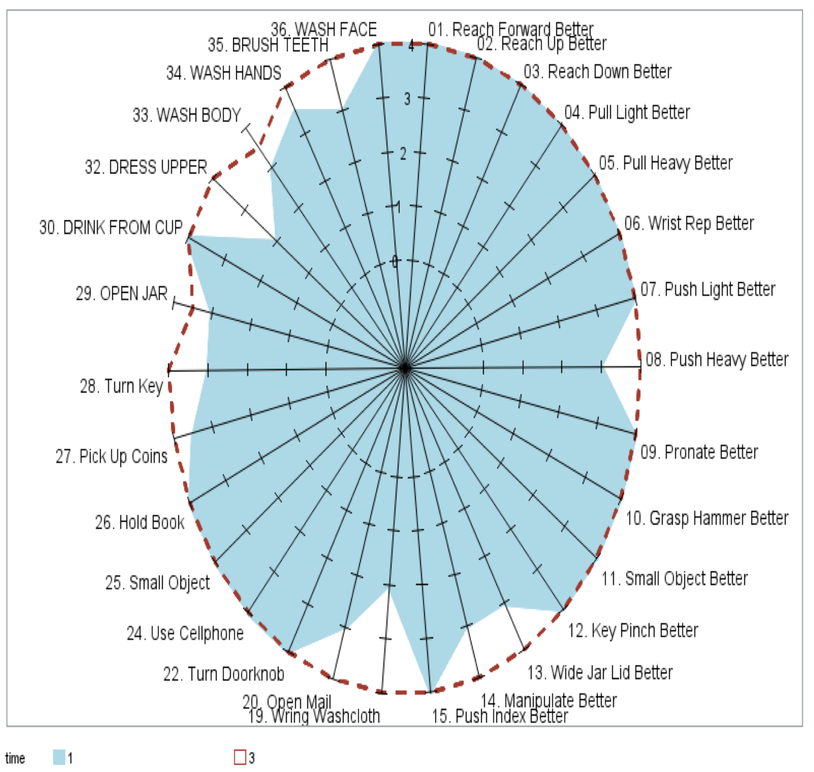
C45 AB SCI-FI and CUE Better Side Median Scores



C6-T1 AB SCI-FI and CUE Better Side Median Scores

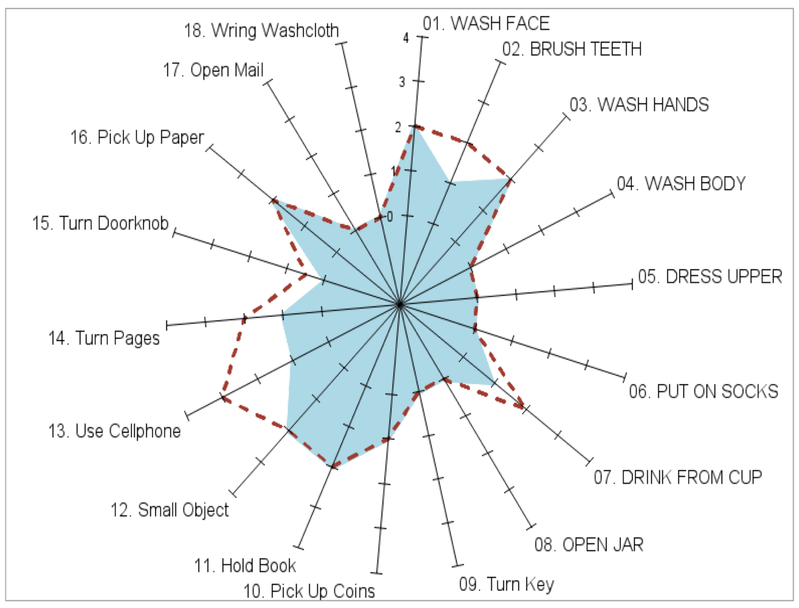


C6-T1 CD SCI-FI and CUE Better Side Median Scores

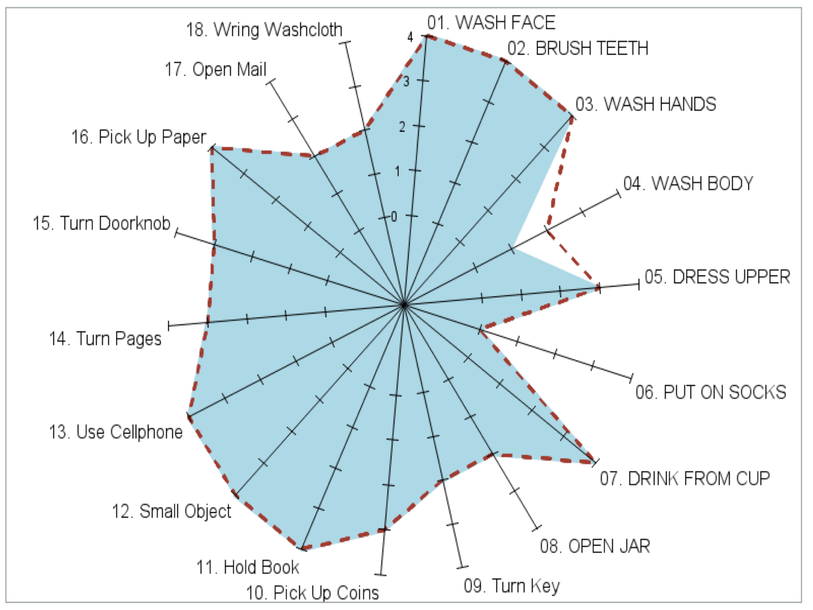


To right:
- SCI-FI self-care items on right, fine motor items on left.
- Blue shading represents scores without AT; Red dashed line scores with AT.
- Distance along radius from blue shading to red line represents improvement using AT.

C4-C5 CD SCI-FI Median Score at Discharge



C6-T1 AB SCI-FI Median Score at One-year



Conclusion: Many persons with tetraplegia are able to perform self-care and fine motor tasks easier using AT, but the benefit depends on the level and severity of injury. There is a decreased reliance on AT over time, which may in part be due to continued recovery after rehabilitation discharge.